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ABSTRACT

This report assesses the Do-It-Yourself Home Savings Techniques project, which was designed to develop and test an instructional unit for making homes energy efficient. The project, implemented at schools in the Cleveland City School District from October 1981 through February 1983, involved 11 science teachers and approximately 1,200 students. The report includes a program plan, summary of project operations, summary of lesson units with related objectives and activities, and project evaluation. Key project accomplishments are noted: (1) development of a curriculum guide, ("Do-It-Yourself Energy Guide"), consisting of nine energy lessons; (2) assembling of materials required by the instructional activities of the energy lessons; and (3) provision of periodic inservice workshops for participating teachers. Teachers assessed lessons for degree of relevance, practicality, and adaptability to home use while students evaluated them for clarity, quantity of new knowledge, time allowed, and overall usefulness. Teachers also rated the quality of inservice support. In addition, parents responded to energy activities tried in the home. All ratings by students, staff, and parents were markedly favorable. (Appendices contain forms used to collect information and some of the recommendations made for program improvement). (Author/JM)

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DO-IT-YOURSELF HOME SAVINGS TECHNIQUES PROGRAM

Cleveland Public Schools
Cleveland, Ohio

Final Report for Period
September 25, 1981 - June 30, 1983

Prepared by

Ofelia Halasa
Project Evaluator

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Cleveland Public Schools
DEPARTMENT OF RESEARCH AND ANALYSIS

June 1983

Prepared for

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ABSTRACT

The Do-It-Yourself Home Savings Techniques, under the U.S. Department of Energy funding, was designed to develop and test an instructional unit and related instructional materials for making homes energy efficient. The project was implemented at eleven schools in the Cleveland City School District during the period October, 1981 through February, 1983. Estimated federal costs amounted to $28,471. Eleven Science teachers and about 1,200 students were involved in the project. As a result of the favorable assessment of this project by staff, students and parents, plans are being made to integrate the Energy instructional unit with the Physical Science scope and sequence for the 1983-1984 school year.

Key project accomplishments are noted: development of curriculum guide, Do-It-Yourself Energy Guide, consisting of nine Energy lessons; assembling of materials required by the instructional activities of the Energy lessons; and provision of periodic inservice workshops for participating teachers to help teach Energy lessons.

Evaluation of the project operations indicated it was effective in developing and pilot-testing an instructional unit and related materials on energy. Ratings of the Energy instructional unit by students, staff and parents were markedly favorable.

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DO-IT-YOURSELF HOME ENERGY SAVING TECHNIQUES
Final Technical Progress Report

U.S. Department of Energy
Midwest Appropriate Technology Small Grants Program

PROGRAM PLAN

The purpose of this two-year project is to develop and test an instructional unit and related instructional materials for teaching secondary school students techniques for making their homes as energy efficient as possible. As described in the project proposal, the unit would be developed by two science teachers working under the direction of a supervisor from the Department of Science. The unit would consist of nine separate lessons, each dealing with a different topic of energy saving and each designed to be taught in one class period. Each lesson would be accompanied by a kit of materials which would provide the students with hands-on experience in implementing the particular energy saving technique addressed by the lesson. These materials would include large-scale models of window/door and attic/basement frames for use in learning how to install various energy saving materials.

Following the development of the instructional unit, plans called for a series of inservice workshops to instruct about twelve high school science teachers how to use the unit with students. These teachers would each teach the instructional unit to six classes. Both students and teachers would be surveyed for their evaluation of the instructional unit. In addition, the parents of participating students would be asked to complete a checklist to document the number and kinds of energy saving techniques actually implemented in their homes following their children's participation in the program.

SUMMARY OF PROJECT OPERATIONS, 9/25/81 - 6/30/83

The project accomplishments are chronologically detailed below beginning October 1981 through February 1983:

1. The appointment of two Science Department Chairperson as project staff was completed in November, 1982.

2. The nine lessons comprising the Energy instructional unit were completed in June 1982. Six of nine lessons were pilot-tested by the end of the 1981 - 1982 school year. Description of lessons is noted below:

. The nine lessons have been organized into a curriculum guide which includes objectives, content information, illustrations and directions for conducting instructional activities for each lesson. The curriculum guide covers the following topics (See Chart 1 for details): Home Energy Inventory, Energy Loss, Window Glazing, Weatherstripping, Attic Insulation, Basement Insulation, Caulking and Electrical Outlet, Sealing, Storm Window Manufacturing and installation, Passive Energy Saving and Gas and Electric Conversions.

With the exception of the first two lessons in the guide, the lessons are independent of one another and can be taught in any order. Each lesson is designed to be completed in one classroom period.

3. The purchase of the materials (caulk, weatherstripping, insulation, etc.) to be used with the curriculum guide was completed in August, 1982.

4. The development of the prototype versions of attic/basement and window/door frames for demonstrating the installation of insulation, weatherstripping, caulking, window glazing, etc., was completed by April, 1982.

5. The reproduction of the curriculum guides for distribution to teachers was completed in September, 1982.

CHART 1

SUMMARY OF ENERGY LESSON UNITS (N=9) WITH
RELATED OBJECTIVES AND ACTIVITIES

Unit # and Title	Objectives	Activities
1 - Energy Inventory	1a. Students will become aware of the cost and amount of energy used in their own households. 1b. Students will become aware of the cost of operating various appliances in their homes.	. Energy Inventory Survey: Estimated Cost/Hour of Electrical Appliances, comparison of Annual Energy Costs etc.
2 - Energy Lesson	2a. Students will acquire a basic understanding of the differences between conductive heat loss and convective heat loss. 2b. Students will acquire a basic understanding of one technique for identifying areas of conductive heat loss. 2c. Students will acquire a basic understanding of four techniques for identifying areas of convective heat loss.	. Testing classroom walls and windows for conductive heat loss. . Detecting convection leaks using wet hand, flashlight, dollar bill, and hair dryer techniques. Construction/use of a draftmeter.
3 - Window Glazing	3a. Students will be able to replace broken windows and thereby reduce energy consumption.	. Replacing broken windows.

CHART 1 (Cont.)

Unit # and Title	Objectives	Activities
4 - Weatherstripping	4a. Students will become aware of the advantages of weatherstripping.	. Determining the total amount of weatherstripping.
	4b. Students will develop the ability and techniques required to determine where weatherstripping is necessary.	. Installing adhesive
	4c. Students will become aware of the various types of weatherstripping available.	. Types of weatherstripping and procedures for installation.
	4d. Students will develop the skills required to install weatherstripping.	. Installing bottom sweep on doors.
	4e. Students will develop the skills required to determine the amount of weatherstripping that must be purchased to weatherstrip a house.	
5 - Attic Insulation	5a. The student will determine whether or not his home needs additional insulation.	. Installing attic insulation.
	5b. The student will determine if he or she, as an amateur, can install the additional insulation required.	
	5c. The student will identify the specific type and quantity of materials needed to insulate an attic.	

CHART 1 (Cont.)

Unit # and Title	Objective	Activities
	5d. The student will practice the skills necessary to insulate an attic.	
	5e. The student will reduce the consumption of energy used.	
6 - Basement Insulation	6a. Students will recognize places in a basement where insulation is desirable.	. Implementing procedures to insulate basements: determining quantity of insulation, measurement and calculation of area space, installing.
	6b. Students will demonstrate ability to prepare a basement wall for insulation.	
	6c. Students will domonstrate the techniques and skills necessary for installing basement insulation.	
	6d. Students will calculate the amount of insulation required to insulate a basement or crawl space.	
	6e. Students will understand how to insulate a crawl space.	
7 - Caulking and Electrical Outlet Sealing	7a. Students will recognize places where caulking is needed.	. Implementing procedures to caulk and seal: Identify caulking sites, caulking activity, installing outlet plates and plate sealers.

CHART 1 (Cont.)

Unit # and Title	Objective	Activities
	7b. Students will understand the advantages and disadvantages of each of the various types of caulking available.	
	7c. Students will acquire the skills necessary to seal trouble spots with caulking.	
	7d. Students will develop the skills required to install rubber gasket insulation on electrical outlets.	
8 - Storm Windows and Doors	8a. Students will make and install simple but effective storm windows and doors, thereby reducing energy consumption.	. Making and installing storm windows.
9 - Passive Energy Saving	9a. Students will understand the meaning of passive energy savings.	. Areas where energy can be saved, e.g. space heating, water heating, appliances, cooking, refrigeration and air conditioning.
	9b. Students will become aware of the relative budget of a typical household.	
	9c. Students will become aware of many passive energy saving techniques.	

6. The reproduction of the attic/basement and window/door frames for use with the curriculum materials was completed by October 1982.

7. The organization of the curriculum guides, the attic/basement and window/door frames and tha ancillary materials into kits and their distribution to teachers was completed in October, 1982 in accordance with the revised timeline.

8. Commitments were secured from the Science Department chairpersons in the following eleven high schools to participate in the project:

- Aviation High School
- Cleveland School of Arts
- James Ford Rhodes High School
- Jane Addams High School
- John Adams High School
- John F. Kennedy High School
- Lincoln-West High School
- Max S. Hayes High School
- South High School
- West Technical High School

9. The March 9, 1982 meeting served to orient the participating teachers to the purpose of the project and to demonstrate the prototype attic/basement and window/door frames. The meeting was attended by 8 of the 11 Department chairpersons. Project inservice began a month later in April, 1982.

10. A second meeting of the Science Department chairpersons was held on October 21, 1982. Seven of the 11 participating teachers attended. The use of the curriculum guide, attic/basement and window/door frames and the other ancillary materials were demonstrated. Individual demonstrations were provided later to two of the four teachers who were absent for the inservice.

11. Efforts to collect household gas bills from students in March 1982 for comparing energy use before and after project participation was discontinued when teachers reported considerable difficulty in persuading their students to bring their utility bills.

12. The nine-lesson instructional unit on energy saving techniques was implemented in 17 classrooms at eleven schools, with 1210 project participants during the period September 1982 through February 1983. It should be noted that although the project grant period extends to June 30, 1983, the project coordinator reported that project operations were effectively completed February, 1983.

13. Evaluation of project operations was conducted February 1983 to March, 1983.

EVALUATION

Evaluation of the 1981 - 1983 Energy Do-It-Yourself Project focused on assessment of project quality based on questionnaire responses collected from participating teachers, and a sample of students and parents at the end of the project operations. Project evaluation addresses the following questions:

1. What was the quality of instructional materials and inservice support for teachers?

2. To what extent were the energy saving measures covered by the instructional unit applied at home? What did students and parents think of these energy saving measures?

The questionnaires (Refer to Appendix B) were administered during the latter part of February 1983 to the following groups:

17 Science Teachers

297 Students

59 (20%) tenth graders

87 (29%) eleventh graders

94 (51%) twelfth graders

160 Parents

"What was the quality of instructional materials and inservice support for teachers?"

To answer this question, responses of teachers, students and parents to questionnaires were examined relative to the following:

- teachers' opinions about the inclusion of the Energy instructional unit relative to appropriateness/relevance, adaptibility for home use and practicality. What teachers think about the locally-developed quide.

- parents' opinions about the lessons

- students' opinions about the project.

Quality of Instructional Materials

Teachers' ratings of the nine Energy lessons regarding degree of relevance of inclusion in the regular science program was highly favorable. Ratings were based on a five-point rating scale, with 5 as Excellent to 1 as Poor. Average ratings for the nine Energy lessons ranged from 4.23 (Above Average) to 4.71 (Excellent). The value of the locally-developed curriculum guide was confirmed by 10 (59%) of 17 respondents who indicated that Energy lessons can be taught using the curriculum guide only (Appendix C-1).

Teachers' ratings of nine Energy lessons, relative to their practicality in application and adaptability to home use, were highly favorable. Average ratings relative to practicality in application ranged from 4.06 (Above Average) to 4.71 (Excellent). Similar ratings were noted for the adaptability for home use, which ranged from 3.94 (Above Average) to 4.64 (Excellent). The average ratings provided for the nine Energy lessons for relevance, practicality and adaptability for home use are presented on the following table.

TABLE 1

MEAN TEACHERS RATINGS FOR NINE ENERGY LESSONS*

Lesson	Relevance	Practicality	Adaptability to Home Use
Energy Inventory	4.47 (AA)	4.17 (AA)	4.23 (AA)
Energy Loss	4.71 (E)	4.64 (E)	4.64 (E)
Window Glazing	4.43 (AA)	4.59 (E)	4.59 (E)
Weatherstripping	4.29 (AA)	4.35 (AA)	4.52 (E)
Attic Insulation	4.59 (E)	4.71 (E)	4.41 (AA)
Basement Insulation	4.23 (AA)	4.06 (AA)	3.94 (AA)
Caulking & Sealing	4.47 (AA)	4.65 (E)	4.59 (E)
Storm Windows & Doors	4.47 (AA)	4.59 (E)	4.41 (AA)
Passive Energy Savings	4.47 (AA)	4.23 (AA)	4.29 (AA)

* E - Excellent, AA - Above Average

Students' ratings (N=300) of the Energy lessons and their activities were highly favorable, as students' mean ratings ranged from 3.35 (Average) to 4.04 (Above Average). The following table present the mean ratings for 10 qualitative characteristics (refer to Appendix C-2 for details).

TABLE 2

MEAN STUDENTS' RATINGS FOR ENERGY LESSONS

Characteristic	Mean	Rating
Clarity of purpose	3.95	Above Average
Method of presentation of Energy activities	3.83	Above Average
Clarity of content	3.78	Above Average
Usefulness of Energy activities	4.07	Above Average
Usefulness of materials used in Energy activities	4.04	Above Averave
Quantity of new knowledge	3.93	Above Average
Adequacy of time for the Energy lessons	3.35	Average
Overall usefulness of Energy lessons	3.98	Above Average

About 117 (73%) out of 160 parents who responded to a questionnaire, were aware that their children were learning how to save energy (or heat) costs. The most frequent source of knowledge came from the following:

- parent discussion with their children
- applications at home of what is learned at school.

About 89% of the 117 parent respondents recommended that Energy instructional unit should be a regular part of the school program. (Refer to Appendix C-3 for details).

Quality of Inservice Support

Teachers (N=17) rated the Energy Workshops very positively with average ratings ranging from 3.89 (Above Average) to 4.83 (Excellent). The ratings were based on a five-point rating scale with 5 as Excellent and 1 as Poor. Distribution of teachers' ratings on 10 quality descriptors are presented below (refer to Appendix C-1 for details):

TABLE 3

MEAN RATINGS ON TEN QUALITY DESCRIPTORS

Descriptor	Mean	Rating
Clarity of purpose	4.77	Excellent
Method of presentation	4.38	Above Average
Clarity of content	4.53	Above Average
Usefulness of ideas	4.83	Excellent
Usefulness of materials	4.53	Above Average
Opportunity for interaction	4.29	Above Average
Effectiveness of discussion	4.23	Above Average
Quantity of new knowledge Skills	4.02	Above Average
Adequency of time	3.89	Above Average
Overall usefulness of session	4.59	Above Average

*Based on a five-point rating scale: 5 - Excellent, 4 - Above Average, 3 - Average, 2 - Below Average and 1 - Poor

Ten of the seventeen teachers (59%) reported that the curriculum guide alone (without any inservice) is adequate enough to implement the Energy lessons. However, the remaining 41% (or 7 of the 17 teachers) indicated that the Energy lessons cannot be integrated into the science curriculum without comparable in-service.

Comments of the seven respondents who called for inservice sessions alluded to opportunities for "hands-on experience." They pointed out that opportunities to use the materials or supplies were provided by the inservice sessions.

"To what extent were the energy saving measures, covered by the instructional unit, applied at home"?

To answer this questions, responses of parents and students were analyzed relative to the following:

— students' opinion regarding the applicability of the activities in their homes.

— report of energy activities that were tried out at home by students and parents.

— parents' opinions about the energy activities, based on their observation of what their children did at home.

Applicability of Energy Lessons At Home

Teachers' ratings in Table 1 showed that all nine Energy lessons showed better than average practicality and adaptability for home use. Teachers' perceptions were confirmed by 76% (N=225) of 300 student participants who said that they had tried out some of the Energy-saving activities. The five more-frequently tried activities are noted below (refer to Appendix C-2 for details).

Activity	N(%)
. Read/understand utility bills	225 (76%)
. Energy Inventory Survey	216 (73%)
. Testing for heat loss	211 (70%)
. Techniques for detecting leaks	203 (68%)
. Construction/use of a draftmeter	194 (65%)

The five more-frequently applied Energy-saving activities listed by parents (N=117) are noted below:

Activity	
. Testing walls/windows for draft	93 (78%)
. Read/understand utility bills	90 (77%)
. Passive energy savers, e.g. turning off lights oven use	85 (73%)
. Techniques for detecting leaks	78 (67%)
. Weatherstripping windows, doors	72 (62%)

Some comments of students for non-application of energy-saving activities are noted below (Refer to Appendix C-4 for more details):

"Because I didn't have to, it was already done."

"Really I didn't try any of the others because maintenance takes care of that and we don't pay utilities."

"Already had storm windows, attic well insulated, no knowledge of draftmeter."

"Impractical because I didn't have repair tools or money to buy tools. Do not have a basement."

"It cost money to do these things."

"Because I didn't have the time to do these things."

"Because my dad did it all."

"I don't mess with my dads work because he gets mad."

"Because most of it was done when the house was remodeled - no opportunity."

Problems

The problems encountered during the implementation of this project have been detailed in the 1981 - 1982 Annual Technical Progress Report and the Semi-Annual Technical Progress Report for the 1981 - 1982 school year. Some of the problems are summarized below:

- Delay in notification of the grant award resulted in difficulty in following the project timelines schedule. Problems in locating a firm willing to produce windows and door frames and subsequent production delays shortened the time necessary to implement the project. Subsequent revision of the timelines offset the loss of time as portions of the project operations were phased into the 1982 - 1983 shcool year.

- Difficulty occurred in persuading students to bring in their household gas bills for comparing energy use before and after participation in the project. According to the teachers, both students and parents appeared mistrustful of the teachers' motivations in requesting the bills, despite explanations and a letter to parents describing the reasons for the request.

Some of the problems listed by the teachers toward the end of the project implementation included the following:

- Class sizes were sometimes too large to do an effective job of teaching the energy lessons.
- The physical set-up created some logistical problems.
- There were not enough materials and supplies to go around.
- Integration of the Energy lessons into the regular science curriculum sometimes created a problem because there was not enough time to teach additional units.

SUMMARY & RECOMMENDATIONS

The Do-It-Yourself Home Energy Savings Techniques, under the U.S. Department of Energy funding, was implemented at eleven schools during the period October, 1981 through February, 1983. An estimated federal costs amounted to $28,471. Eleven Science teachers and about 1,200 students were involved in the project. A Science-department supervisor administered the project on a part-time basis.

Assessment of the project by teachers, students, and parents was markedly favorable. As a result, the Science Department has included the Energy instructional unit in the Physical Science scope and sequence. Physical Science teachers will have the option to use all or parts of the Energy materials in their course work. Materials required for project implementation will be made available in the Fall of '83 and inclusion of this topic have been planned for the October meeting of the Science Chairpersons. Key project accomplishments are noted below:

- Development of a curriculum guide, Do-It-Yourself Energy Guide, consisting of nine Energy lessons;
- Assembling of materials required by the instructional activities of the Energy lessons;
- Prevision of periodic inservice workshops for participating teachers to help teach Energy lessons.

Evaluation of the project operations indicated it was effective in meeting the objective and was rated very positively by participating teachers, students and parents. Questionnaire responses of the three groups indicated the following:

1. Participating teachers rated the inservice sessions as highly effective.

2. Participating teachers provided markedly favorable ratings (Above Average to Excellent) for the nine Energy lessons and related activities, in terms of relevance, practicality and adaptability for home use. Over half of the respondents pointed out that although the inservice sessions were very helpful, the guide is adequate enough.

3. Reactions of participating students to the Energy lessons were markedly positive as Above Average ratings were given to the lessons.

4. Both teachers and students provided Above Average ratings of the adaptability and practicality of the nine Energy lessons and activities. Students reported that activities frequently implemented at home included the following: reading/understanding of utility bills, energy inventory survey, techniques for detecting leaks and construction/use of draftometer.

5. More students would have been able to implement some of the activities at home, were it not for the restrictions imposed by parents and by the apartment management etc.

6. Parents of project participants were equally enthusiastic about the project with a majority calling for the integration of the Energy instructional unit into the regular science program.

If the project is to continue, staff recommendations called for smaller class size, access to more materials and equipment and increasing allocated Science time.

APPENDIX A

LISTING OF SCHOOLS AND NO. OF PARTICIPANTS

School	N
Cleveland School of Arts	35
Avition	60
Health Career Centers	60
James F. Rhodes	55
Jane Addams Business Center	72
John Adams	135
John F. Kennedy	250
Lincoln West	350
Max Hayes	35
South High	38
West Technical	120
Total	1210

PARTICIPANTS IN "DO-IT-YOURSELF HOME ENERGY SAVING TECHNIQUES" PROGRAM

SCHOOL	TEACHER	PHONE
Aviation	Diana Huguley	School - 621-1357 Home - 883-8372
Cleveland School of the Arts	Dennis Zelvis	School - 229-6155 Home - 734-2058
Health Careers Center	Serge Krauss	School - 579-9984 Home -
James Ford Rhodes	Alfred Pompeani	School - 351-6285 Home -
Jane Addams	Robert Midlik	School - 621-2131 Home -
John Adams	Ronald Delanis	School - 561-2200 Home -
John F. Kennedy	Katherine McKinney	School - 921-1450 Home -
Lincoln-West	James Cassidy	School - 631-1505 Home - 226-5880
Max S. Hayes	Noah Jones	School - 631-1528 Home - 681-3067
South	William Staudenbaur	School - 641-0410 Home - 543-5938
West Tech	Donald Damm	School - 281-9100 Home - 843-6210
Division of Science	Bryan W. Powers	Office - 574-8218
John Adams	Robert Benjamin	School - 561-2200
Lincoln-West	Leo Deininger	School - 631-1505

DO IT YOURSELF HOME ENERGY SAVINGS

Parents' Checklist

January 1983

To Parent:

Your child has been taught how to save energy (or heat) costs at home. To determine if your child is using the activities to save heat costs, your cooperation is requested in completing the questions below.

Thank you.

Science Teacher

. Did you know before you received this form, that your child was learning how to save energy or heat costs?

1 Yes 2 No

(1) IF NO, STOP HERE, AND DO NOT COMPLETE THE REST OF THE QUESTIONS.

IF YES, ANSWER THE FOLLOWING QUESTIONS:

. How did you hear about the energy or heat saving costs? Mark with an "X" all the answers that apply.

(2) ___ discussion with my child (children)

(3) ___ from other parents

(4) ___ concern of my child about heat costs.

(5) ___ visits to schools

(6) ___ other (specify)_____.

(7) ___ child tried out activities to save heat costs at home

APPENDIX B

. Mark below if your child tried to or used the following activities at your home to save energy:

	Activity	Yes	No	Don't Know
(8)	read/understand utility bills			
(9)	list energy sources			
(10)	checking windows/walls/doors for heat loss			
(11)	checking for leaks in the home (doors etc.)			
(12)	measure heat loss			
(13)	weatherstrip windows, doors			
(14)	insulate attic			
(15)	insulate basement			
(16)	seal an electrical outlet			
(17)	assist or install storm windows			
(18)	concern of how to save energy, e.g. use of ovens, turning off lights			

. Should teaching of energy (heat) saving costs be a regular part of learning in the school?

(19) 1 Yes 2 No

. List one recommendation to encourge your child to apply what he learned in energy-saving costs at home:

_____

(20-21)

___ ___ ___
School Code

APPENDIX B

DO-IT-YOURSELF HOME ENERGY SAVINGS

STAFF REACTION FORMS

January 1983

Please supply the information requested in the spaces below by marking or tilling out the appropriate code.

(1) . Identify respondent:

1 Science Teacher 2 Non-Science Teacher

3 Other (Identify) _____.

(2-4) . Identify School Code: _ _ _

To the right of each characteristic listed below, mark one box under which most accurately indicates your impression of Energy Workshops:

Characteristic	Excellent	Above Average	Average	Below Average	Poor	Not Applicable
(5) Clarity of purpose	☐	☐	☐	☐	☐	☐
(6) Method of presentation	☐	☐	☐	☐	☐	☐
(7) Clarity of content	☐	☐	☐	☐	☐	☐
(8) Usefulness of ideas	☐	☐	☐	☐	☐	☐
(9) Usefulness of materials	☐	☐	☐	☐	☐	☐
10) Opportunity for interaction	☐	☐	☐	☐	☐	☐
11) Effectiveness of discussion	☐	☐	☐	☐	☐	☐
12) Quantity of new knowledge/ skills acquired	☐	☐	☐	☐	☐	☐
13) Adequacy of time	☐	☐	☐	☐	☐	☐
14) Overall usefulness of session	☐	☐	☐	☐	☐	☐

. To the right of each Energy unit below, rate the degree of relevance of inclusion to the science curriculum (col. 1), practicality in application (col. 2), and adaptability to home use (col. 3). Use the following rating system:

5	4	3	2	1
Excellent	Above Average	Average	Below Average	Poor

Unit #	Title	Relevance	Practicality	Adaptability to Home Use
1	Energy Inventory	___		
2	Energy Loss	___	___	___
3	Window Glazing	___	___	___
4	Weatherstripping	___	___	___
5	Attic Insulation	___	___	___
6	Basement Insulation	___	___	___
7	Caulking & Sealing	___	___	___
8	Storm Windows & Doors	___	___	___
9	Passive Energy Savings	___	___	___

(45) . Will you continue to teach these units? 1 Yes 2 No

Comments: _____

_____

Can you teach the Energy lessons using the curriculum guide only? Mark one answer only:

(46) . 1 YES 2 NO

. If NO, why not? _____

_____.

List one recommendation to help you integrate Energy lessons units into the regular Science curriculum.

_____.

APPENDIX B

ENERGY-SAVING CURRICULUM

Students' Questionnaire

January 1983

Grade ___ ___ (1) (2)

School Code ___ ___ ___ (3) (4)

To Student:

Will you share with us what you think of the Energy lesson in your Science class and what you have done to use these ideas at your home to save energy cost.

Thank you.

Science Teacher

To the right of each characteristic below, indicate the rating which most accurately describe what you think of the Energy lessons and activities. Use the following rating system:

5	4	3	2	1
Excellent	Above Average	Average	Below Average	Poor

	Characteristic	Rating
(5)	Clarity of purpose	___
(6)	Method of presentation of Energy activities	___
(7)	Clarity of content	___
(8)	Usefulness of Energy activities	___
(9)	Usefulness of materials used in Energy activities	___
(10)	Quantity of new knowledge	___
(11)	Adequacy of time for the Energy lessons	___
(12)	Overall usefulness of Energy lessons	___

APPENDIX B

Mark with an X the 5 activities you consider to be most useful for energy saving at your home.

(13) Reading Utility Bills

(14) Energy Inventory Survey

(15) Testing walls/windows for Heat Loss

(16) Technique for Detecting Leaks

(17) Construction/use of Draftometer

(18) Replacing Broken Windows

(19) Weatherstripping Activities (windows, doors)

(20) Attic Insulation

(21) Basement Insulation

(22) Caulking & Electrical Outlet Sealing

(23) Installing Strom Windows

(24) Utilize passive energy savers

Check the two Energy units that seemed most meaningful to you in terms of their application to Energy Saving.

(25) Energy Inventory

(26) Energy Loss

(27) Window Glazing

(28) Weatherstripping

(29) Attic Insulation

(30) Basement Insulation

(31) Caulking & Sealing

(32) Storm Windows & Doors

(33) Passive Energy Savings

APPENDIX B

Did you try out some of the Energy-Saving activities at your home?
__1__ yes __2__ No

(34) If yes, check those that you applied:

(35) ___ Reading Utility Bills

(36) ___ Energy Inventory Survey

(37) ___ Testing walls/windows for Heat Loss

(38) ___ Technique for Detecting Leaks

(39) ___ Construction/use of Draftometer

(40) ___ Replacing Broken Windows

(41) ___ Weatherstripping Activities (windows, doors)

(42) ___ Attic Insulation

(43) ___ Basement Insulation

(44) ___ Caulking & Electrical Outlet Sealing

(45) ___ Installing Storm Windows

(46) ___ Utilize passive energy savers

If No, why? _____

_____.

List recommendations to help you learn more about energy saving:

_____

_____

APPENDIX C-1

SUMMARY OF STAFF REACTION FORM RESPONSES

DO-IT-YOURSELF HOME ENERGY SAVINGS

January 1983

Please supply the information requested in the spaces below by marking or filling out the appropriate code.

(1) . Identify respondent:

14 (84%) Science Teacher None-Science Teacher 3 (18%) No Response

_ Other (Identify) _____.

(2-4) . Identify School Code: _ _ _

To the right of each characteristic listed below, mark one box under which most accurately indicates your impression of Energy Workshops:

	N Distribution of Responses					
Characteristic	Excellent	Above Average	Average	Below Average	Poor	$\bar{X}$ Rating
5) Clarity of purpose	13 (77%)	4 (23%)				4.77 (E)
6) Method of presentation	6 (35%)	10 (59%)				4.38 (AA)
7) Clarity of content	9 (53%)	8 (47%)				4.53 (AA)
8) Usefulness of ideas	15 (88%)	1 (6%)	1 (6%)			4.83 (AA)
9) Usefulness of materials	10 (58%)	6 (35%)	1 (6%)			4.53 (AA)
10) Opportunity for interaction	7 (41%)	8 (47%)	2 (12%)			4.29 (AA)
11) Effectiveness of discussion	6 (35%)	9 (53%)	2 (12%)			4.23 (AA)
12) Quantity of new knowledge/ skills acquired	10 (59%)	3 (18%)	3 (18%)		1 (6%)	4.02 (AA)
13) Adequacy of time	6 (35%)	4 (23%)	6 (35%)	1 (69%)		3.89 (AA)
14) Overall usefulness of session	11 (65%)	5 (29%)	1 (6%)			4.59 (AA)

The energy workshops were rated to be generally Above Average on ten quality descriptors.

. To the right of each Energy unit below, rate the degree of relevance of inclusion to the science curriculum (col. 1), practicality in application (col. 2), and adaptability to home use (col. 3). Use the following rating system:*

5 Excellent (E)	4 Above Average (AA)	3 Average (A)	2 Below Average (BA)	1 Poor (P)

Unit #	Title	Relevance	Practicality	Adaptability to Home Use
1	Energy Inventory	4.47	4.17	4.23
2	Energy Loss	4.71	4.64	4.64
3	Window Glazing	4.43	4.59	4.59
4	Weatherstripping	4.29	4.35	4.52
5	Attic Insulation	4.59	4.71	4.41
6	Basement Insulation	4.23	4.06	3.94
7	Caulking & Sealing	4.47	4.65	4.59
8	Storm Windows & Doors	4.47	4.59	4.41
9	Passive Energy Savings	4.47	4.23	4.29

(45) . Will you continue to teach these units?

Comments: See attached.

Can you teach the Energy lessons using the curriculum guide only? Mark one answer only:

(46) . 10 (59%) YES 7 (41%) NO

. If NO, why not? _____

List one recommendation to help you integrate Energy lessons units into the regular Science curriculum.

See attached.

*The nine Energy units were rated by the 17 Science teachers to be highly relevant, practical and adaptible to home use:

. Practicality ratings ranged from 4.71 (AA) to 4.06 (AA).

. Adaptability ratings ranged from 4.64 (AA) to 3.94 (AA).

APPENDIX C-1

STAFF REACTION FORMS

Will you continue to teach these units?

Comments:

"Our classes suffered by having too few props for our class size. Our school is small, but the class sizes were large. Logistics in our facility are atrocious."

Some students were really interested and used the information.

I think this is very useful to my students application of science.

Will probably extend time of teaching.

Good students' reception.

Our curriculum and physical set-up, however, causes some real set-up problems.

Anything that results in money saved in energy costs seem to be very relevant and has high pupil interest.

Can you teach the Energy lessons using the curriculum guide only? Mark one answer only. If No, Why not.

Comments:

"Not mearly as well as with materials."

Need material.

If the teacher had not attempted these things around her/his home and had not attended the inservice training, some methods would be unclear.

I need the expendable materials and the basement-attic and window models as well as the guide.

Need more reading material and additional exercise.

Need the materials and hand-on experiences.

Materials and supplies are necessary.

Recommendations

We might profit from a unit on calculation of heat loss from homes. This integrates well into Physical Science unit on heat and temperature.

Should only be used in environmental science.

Need more inservice.

Use as lab 2 times or once a week as relief from regular class work. The students love it.

Provide it in October.

We could create a unit on quantitative analysis of Energy loss based on the actual structure of one's house e.g. 1) How much heat is lost through walls of various materials, 2) through non weather-stripped or caulked places, 3) through ceiling vs. wall and 4) through open doors etc.

Need more equipment - House was good, - Need to be reinforced, - Need three more units and the Energy Inventory needs work and development.

Increase class time. The curriculum is already quite full.

SUMMARY OF STUDENTS' QUESTIONNAIRE RESPONSES
ENERGY-SAVING CURRICULUM
January 1983

Grade	N(%)
10	59(20)
11	87(29)
12	94(31)
No Response	58(20)

School (N=12)
(See attached)

To Student:

Will you share with us what you think of the Energy lesson in your Science class and what you have done to use these ideas at your home to save energy cost.

Thank you.

Science Teacher

To the right of each characteristic below, indicate the rating which most accurately describe what you think of the Energy lessons and activities. Use the following rating system:

5	4	3	2	1
Excellent (E)	Above Average (AA)	Average (A)	Below Average (BA)	Poor (P)

	Characteristic	Rating
(5)	Clarity of purpose	3.95 (AA)
(6)	Method of presentation of Energy activities	3.83 (AA)
(7)	Clarity of content	3.78 (AA)
(8)	Usefulness of Energy activities	4.07 (AA)
(9)	Usefulness of materials used in Energy activities	4.04 (AA)
(10)	Quantity of new knowledge	3.93 (AA)
(11)	Adequacy of time for the Energy lessons	3.35 (A)
(12)	Overall usefulness of Energy lessons	3.98 (AA)

Summary: The Energy lessons and activities were rated to be above Average in terms of seven qualities; adequacy of time was rated to be only Agverage.

Did you try out some of the Energy-Saving activities at your home?

225 (76%) 25 (8%) 50 (15%) No Response

(34) If yes, check those that you applied:

		N	%	
(35)	___ Reading Utility Bills	225	(76%)	1
(36)	___ Energy Inventory Survey	216	(73%)	2
(37)	___ Testing walls/windows for Heat Loss	211	(70%)	3
(38)	___ Technique for Detecting Leaks	203	(68%)	4
(39)	___ Construction/use of Draftometer	194	(65%)	5
(40)	___ Replacing Broken Windows	190	(64%)	6
(41)	___ Weatherstripping Activities (windows, doors)	177	(59%)	7
(42)	___ Attic Insulation	174	(58%)	8
(43)	___ Basement Insulation	171	(57%)	9
(44)	___ Caulking & Electrical Outlet Sealing	168	(56%)	10
(45)	___ Installing Storm Windows	164	(55%)	11
(46)	___ Utilize passive energy savers	155	(52%)	12

If No, why? _____

_____

List recommendations to help you learn more about energy saving:

_____

_____

APPENDIX C-2

STUDENTS' REACTION FORMS

Comments and reasons for non-application of Energy Saving Activities:

"Because I didn't have to, it was all ready done."

"Really I didn't try any of the others because maintenance takes care of that and we don't pay utilities."

"Already had storm windows, attic well insulated,no knowledge of draftmeter."

"Didn't have the time."

"Because I didn't think it would help me."

"Because I didn't know the first thing about reading utility bills."

"I never tried any of them because I didn't know how to do the activities."

"It cost money to do these things."

"Impractical because I didn't have repair tools or money to buy tools. Do not have a basement."

"It cost money to do these things."

"Some of the activities we did not use."

"Because of lack of knowledge on the subject."

"Because I didn't have the time to do these things."

"Not needed in home yet."

"Because we already have insulation, weatherstripping, and storm windows."

"Because we don't need these things."

"Because my dad did it all."

"I don't mess with my deads' work because he gets mad."

"No time."

"My father does most of these."

"Because most of it was done when the house was remodeled - no opportunity."

"Because I really didn't find them necessities."

"No materials. Need materials to work with."

RECOMMENDATIONS

Recommendations and comments on learning more about Energy saving:

Include lessons on TV and Radio.

Visit your Electric Company and your Gas Company and find out all you can about saving energy.

Learn how to stop doing unnecessary things and stop being forgetful.

Give more time to explain about material and insulation.

More information to study.

The course given was sufficient enough to teach me the basic of home insulation.

I would recommend getting pamphlets.

We need more experience with the subjects.

Order some kind of booklet on the thing you would like to fix.

Get booklets on Energy-Saving or call the Gas or Light Company for more information.

Need handouts.

The teaching was very good, the only thing wrong not enough time to work with the materials.

Send for Energy Saver pamphlets.

Listen to the teacher more often.

Do more about reading utility bills.

A good teacher to teach more on subject of Energy saving.

Teach at a slower pace so I could get a better understanding.

Provide more time on selected activities to learn more about it.

More time, and equipment.

The lesson should be longer, it should be given on a semester basis. Need more equipment to work with - speakers from the Gas and Light Company.

Take more time and let the students help in experiments.

Have home contractors talk about subject, have little more time to do this subject.

APPENDIX C-2

Home owner Magazines and the Nac and maybe Time Life Books.

Offer it as part of Science.

Have more group work to help us understand more.

Everybody should do there own project instead of group participation.

APPENDIX C-3

SUMMARY OF PARENT'S SURVEY RESPONSES
DO IT YOURSELF HOME ENERGY SAVINGS

January 1983

To Parent:

Your child has been taught how to save energy (or heat) costs at home. To determine if your child is using the activities to save heat costs, your cooperation is requested in completing the questions below.

Thank you.

Science Teacher

. Did you know before you received this form, that your child was learning how to save energy or heat costs?

117(73%) Yes 34(21%) No 9(6%) No Response

(1) IF NO, STOP HERE, AND DO NOT COMPLETE THE REST OF THE QUESTIONS.

IF YES, ANSWER THE FOLLOWING QUESTIONS:

. How did you hear about the energy or heat saving costs? Mark with an "X" all the answers that apply.

			Rank Order
(2)	100(86%)	discussion with my child (children)	1
(3)	19(16%)	from other parents	4
(4)	61(52%)	concern of my child about heat costs.	3
(5)	5(4%)	visits to schools	6
(6)	9(9%)	other(specify) Science Teacher*	5
(7)	78(67%)	child tried out activities to save heat costs at home	2

*1 as most frequent answer, 6 as least frequent response.

**East Ohio Gas Co. Supper and Speech Homework, TV and Radio.

. Mark below if your child tried to or used the following activities at your home to save energy:

	Activity	YES	NO	Don't Know	No Response
(8)	read/understand utility bills	90(77%)	04(31%)	07(6%)	16(14%)
(9)	list energy sources	45(39%)	20(17%)	19(16%)	33(28%)
(10)	checking windows/walls/doors for heat loss	93(78%)	8(7%)	2(2%)	14(12%)
(11)	checking for leaks in the home (doors etc.)	78(67%)	13(11%)	1(1%)	25(21%)
(12)	measure heat loss	29(25%)	35(30%)	16(14%)	37(32%)
(13)	weatherstrip windows, doors	72(62%)	24(21%)	3(3%)	18(15%)
(14)	insulate attic	29(25%)	47(40%)	4(3%)	37(32%)
(15)	insulate basement	26(22%)	42(36%)	7(6%)	42(36%)
(16)	seal an electrical outlet	35(30%)	33(28%)	7(6%)	42(36%)
(17)	assist or install storm windows	59(50%)	21(18%)	5(4%)	32(27%)
(18)	concern of how to save energy, e.g. use of ovens, turning off lights	85(73%)	5(4%)	5(4%)	22(19%)

. Should teaching of energy (heat) saving costs be a regular part of learning in the school?

(19) 104(89%) Yes 1(1%) No 12(10%) No Response

. List <u>one</u> recommendation to encourge your child to apply what he learned in energy-saving costs at home:

Recommendations and comments are noted on attached sheet.

RECOMMENDATIONS

"Make him/her aware of the cost of Energy."

"Provide credit in class."

Have your child read and try to do it."

"Have an Energy day at school."

"Teach it at school."

"... Practice what he learned such as how to caulk around windows, around doors plus put the weather stripping around the main doors, plus how he's always turning out the lights..."

"... Parents to let child do at home what he is learning about Energy..."

"... Talk about saving Energy at home such as turnig off unnecessary lights..."

"... Heat turned lower and relate to Energy lesson units..."

"... Parents to show (compare) difference in electric bills when heat is turned off (lowered) and heat is turned up..."

"... Discuss Energy lessons units and relate Energy costs at home..."

"... More Energy classes at school..."

APPENDIX C-4

Comments and reasons for non-application of Energy Saving Activities:

"Because I didn't have to, it was already done."

" . . . I didn't try any of the others because maintenance takes care of that and we don't pay utilities."

"Already had storm windows, attic well insulated,no knowledge of draftmeter."

"Didn't have the time."

"Because I didn't think it would help me."

"Because I didn't know the first thing about reading utility bills."

"I never tried any of them because I didn't know how to do the activities."

"It cost money to do these things."

"Impractical because I didn't have repair tools or money to buy tools. Do not have a basement."

"It cost money to do these things."

"Some of the activities we did not use."

"Because of lack of knowledge on the subject."

"Because I didn't have the time to do these things."

"Not needed in home yet."

"Because we already have insulation, weatherstripping, and storm windows."

"Because we don't need these things."

"Because my dad did it all."

"I don't mess with my dad's work because he gets mad."

"No time."

"My father does most of these."

"Because most of it was done when the house was remodeled - no opportunity."

"Because I really didn't find them necessary

"No materials. Need materials to work with."

APPENDIX C-5

RECOMMENDATIONS

"Include lessons on TV and Radio."

"Visit your Electric Company and your Gas Company and find out all you can about saving energy."

"Learn how to stop doing unnecessary things and stop being forgetful."

"Give more time to explain about material and insulation."

"More information to study."

"The course given was sufficient enough to teach me the basic of home insulation."

"I would recommend getting pamphlets."

"We need more experience with the subjects."

"Order some kind of booklet on the thing you would like to fix."

"Get booklets on Energy-Saving or call the Gas or Light Company for more information."

"Need handouts."

"The teaching was very good, the only thing wrong not enough time to work with the materials."

"Send for Energy Saver pamphlets."

"Listen to the teacher more often."

"Do more about reading utility bills."

"A good teacher to teach more on subject of Energy saving."

"Teach at a slower pace so I could get a better understanding."

"Provide more time on selected activities to learn more about it."

"More time, and equipment."

"The lesson should be longer, it should be given on a semester basis. Need more equipment to work with - speakers from the Gas and Light Company."

"Take more time and let the students help in experiments."

"Have home contractors talk about subject, have little more time to do this subject."

CLEVELAND PUBLIC SCHOOLS
Department of Curriculum and Instruction
Office of Science

Home Energy Workshop
October 21, 1982

A G E N D A

3:15 - 3:25 p.m.	Welcome/Objectives of Workshop Bryan W. Powers
3:25 - 3:45 p.m.	The Do-It-Yourself Home Energy Savings Curriculum Bryan W. Powers
3:45 - 4:30 p.m.	Attic, Basement, Window and Door Frames to be used (Hands On Experience) Robert Benjamin
4:30 - 5:00 p.m.	Implementation of the Home Energy Techniques (Hands On Experience) Robert Benjamin
5:00 - 5:15 p.m.	Explanation of all materials needed for the Do-It-Yourself Home Energy Savings Techniques Bryan W. Powers Robert Benjamin
5:15 - 5:30 p.m.	Question/Answer Period - Evaluation

APPENDIX D

CLEVELAND PUBLIC SCHOOLS
Department of Curriculum and Instruction
General Education Division
Office of Science

TO: Teachers - Home Energy Program

FROM: Bryan W. Powers
Office of Science

Robert Benjamin
John Adams High School

RE: Completion of Units
The Do-It-Yourself Home Energy Savings Curriculum

Hi!

Just a memo to inform you that according to guidelines for our Energy Project you should have completed all work and lessons by January 14, 1983.

We will have a final workshop early in February to evaluate the program.

HAPPY NEW YEAR!!

Questions ??? Call Bryan 574-8218

January 5, 1983